



## Coal

## Introduction

Hundreds of millions of years after the first coal age, we have entered yet another one. Global demand for coal has increased remarkably, transforming a once sluggish market into a fluid and volatile one. Approximately 7 billion metric tons of coal are produced each year. Nearly 20% of that is traded internationally via bulk freight vessels. Previously dominated by industry players, the increasingly attractive market conditions have lured new participants to the market.

The decision to trade physical products can be a very tricky one. The typical risk-return trade off is made more difficult when considering increased market exposure and logistics management. It is thus paramount that any potential market entrant fully understands the infrastructure needed to operate effectively and efficiently.

## Overview

Coal is the most abundant source of energy on the planet. With approximately 847 billion tonnes in proven reserves, and only 7 billion in annual global production, there is surely no shortage. The largest coal deposits are found in the United States, Russia, and Asia. The majority of coal produced is traded domestically, and thus never hits the international markets. In fact, only 20% of global steam coal production is traded internationally. The largest exporting regions include Indonesia, Australia, South America, and South Africa. This is the volume of coal that is traded and the focus of this paper.

The two main grades of coal that are traded are steam and coking coal. Steam is generally used for producing electricity and accounts for the majority of coal traded in the market. Steam Coal grades vary from low energy Lignite and Sub-Bituminous to higher energy Bituminous. Coking coal, which is used mainly for the manufacture of iron and steel, is physically harder and includes grades Bituminous and Anthracite. Harder coals contain more energy and are less abundant in nature, and thus fetch a higher price. Coal is generally described in contracts by its energy content, moisture, volatile matter, ash, and sulphur (see table for typical coal spec). Different combinations of these elements affect the pricing of the deal, often allowing for certain fluctuations, provided there is a price adjustment.

**Table.1** Typical ARA Coal Spec

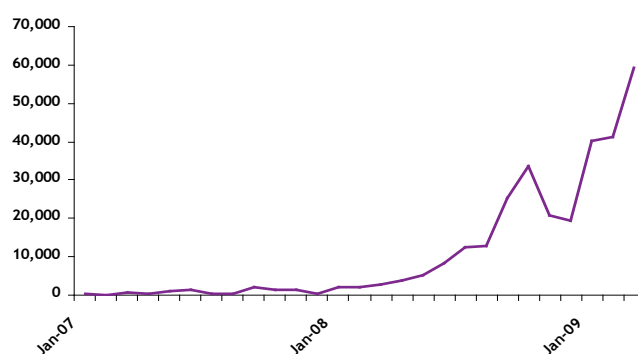
	Net calorific value	Total moisture	Volatile Matter	Ash	Sulphur	Hardgrove Gindability
Typical	6,000 kcal/kg	13%	24 - 38%	8-16%	0.3-1%	45-56
Rejection	less than 5,800 kcal/kg	more than 15%	less than 24% or more than 38%	more than 16%	more than 1%	less than 44

Coal is generally mined via an open cast system or from deep mines. In open cast mining, the coal deposit, or seam, is located near the earth's surface. Large machinery digs into the seam and moves it to a transportation system. This method produces approximately 40% of the world's coal and recovers 90% of coal from the seam. In deep mining, coal seams are found far below the earth's surface. Men and machines are sent below to extract the resource using a number of techniques, recovering only 60-75% of the seam.

In order to leave the mine, the coal is usually loaded onto trucks or trains, where it is then moved to a port for exportation. At the port the coal is stockpiled then loaded onto a bulk vessel. The vessel then leaves port and delivers the coal at its scheduled disport. The coal is then discharged from the vessel, put in a stock pile (and possibly blended), and railed to its final destination.

## Coal Trading

The best place to start is usually the financial markets, as there is no management of the physical product. ICE offers trading in three major index coals; Richards Bay, Rotterdam, and Newcastle. The volumes in these markets have increased exponentially over the past two years (see chart 1).



**Chart 1:** Monthly ICE Volumes

Trading in physical coal is somewhat more relationship based. A market participant can enter into a trade bilaterally, through an OTC broker, or using globalCOAL. Similar to an exchange, globalCOAL provides a platform through which traders can access liquidity of standardised physical products.

OTC brokers have many contacts in the market, and look to match your bid or offer with a counterparty's. This allows for more negotiation in the trading process and is useful for more complex deals. Until only recently, coal was traded in long term contracts. However, due to increased market volatility (Chart 2), producers and consumers are moving towards spot trading and hybrid contracts, for fear of being locked into an unfavourable price structure.

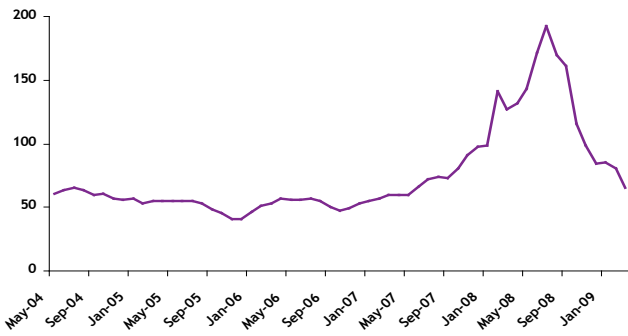


Chart 2: Monthly New Steam Coal Prices

## Logistics

Now that you have a deal, how do you manage it? Matching the buys and sales is the high level aspect of physical operations. Managing how you get the coal to the buyer can prove to be a difficult task if you are not properly prepared in terms of staffing and systems.

Let's say that you have purchased 150,000 MT of steam coal from Richards Bay and have found a buyer in Antwerp. First, you need to get the coal from Richards Bay to Rotterdam and thus you must employ the services of a charterer. Many coal trading operations have their own freight desk, since the vessel must be managed along with the coal. The freight element must be accounted for in the coal system, since the costs greatly impact any profit made on the sale of the coal.

A member of the coal logistics team (known as an operator) must ensure that the coal purchased is of the correct grade and thus random samples of the coal stockpile are ordered and compared to contract specifications. Usually, a difference in grade can be priced in, however, the coal can also be rejected by the buyer. Thus, contract terms should be stored in the coal system, allowing for automatic pricing based on grading results.

The coal operator must then manage the movement of the coal from the stock piles at the load port onto the vessel, and the coal off the vessel onto the stockpiles at the discharge port. Stockpiling can be difficult to manage since portions of the pile might be broken down and sold to multiple counterparties. Thus tracking the movement of the coal and attributing ownership is systematically critical.

Coal contracts allow for a certain amount of time for the loading and discharging of coal known as laytime. If a charterer is given 10 hours to load the vessel and it takes him 12 hours to do so, he will have to pay demurrage to the shipper (the owner of the coal) on the 2 hours extra it took. If he loaded in 9 hours, he would receive despatch for finishing early. While at first glance these calculations seem simple, they are negotiated down to the minute and are based on a statement of facts given by the port operator and the

ship captain.

Finally, invoices must be created in order to represent demands for cash or instruction for payment.

## P&L

It is clear from the discussion above that your profit at the end of the day is not an easy calculation. Unlike derivatives trading, you can not simply P&S your trades and then mark to market. In physical coal trading you must optimise your position through effective management. In our example above, we may have been able to buy the coal at \$40 per MT, and sell it on for \$50. However, we would then need to secure freight for a minimum of \$10 per MT just to break even. On top of the freight cost, one must then factor in laytime costs, as they can be fairly substantial. Thus you need a way to track your purchases, sales, additional costs, and the ability to attribute values to different accounts and contracts.

In terms of valuing open positions, it can be difficult to assign an index to a non standard coal. For example, it is much easier to value coal purchased from Newcastle, as there is a published index, as opposed to coal purchased from Indonesia. In this instance, the coal risk management system must be able to hold bespoke curves and adjustment factors.

Another challenge is P&L attribution. Knowing the large number of variables that can affect the profit of the coal business, it is imperative to turn the tracking ability of the coal system into an application for P&L derivation.

By this point, you have probably realised that very few of your coal contracts will be standardised. As a result, it is difficult to aggregate trades by product or by delivery, as you can with a futures contract. Additionally, due to the cost of logistics, no two trades will ever be the same. Thus, you will need a system that can trace a trade from booking through to cash flow, so that proper reports can be generated.

## Systems and Solutions

There is obviously a tremendous amount to keep track of if you decide to embark on trading physical coal. As with any start up product, it is not unimaginable to put all this information into a system of spreadsheets. However, as your operations grow, you run the risk embedding yourself in a system without robust functionality or controls. There are a number of vendors who provide software for your budding coal business. These include Solarc, TriplePoint, OpenLink, Allegro, Murex, Zainet, and SAP. These packages can either manage the full trade lifecycle or simply parts of it. It is important to choose a system that offers your business a flexible environment in which to grow deep.

## Conclusion

Embarking on physical coal trading can prove to be a profitable venture. However, as always, there is a catch. The coal markets require a lot of attention, especially from an operations standpoint. Managing positions requires specialised staff and systems if it is to be done efficiently. The systems that you use are only as good as the integration and training that have you have put in place to support them. As it may be a new market for you business, you may not have the expertise or resource to implement a complicated integration and process creation.

Excelian is a specialist IT consultancy with the detailed knowledge of the coal markets and a track record of successfully delivered projects. From system selection to fully integrated solutions, Excelian embeds consultants with its client, ensuring effective delivery of business and IT requirements. This also allows for continuous knowledge transfer, shortening the amount of time needed to train employees upon delivery.

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